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Development And Nutritional Evaluation Of Sorghum Flour-Based Crackers Enriched With Bioactive Tomato Processing Residue

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Abstract : Valorization of agro-industrial by-products offers significant economic and environmental advantages. This study investigates the transformation of tomato processing residues into value-added products, contributing to waste reduction and promoting a circular, sustainable economy. Specifically, the development of sorghum flour-based crackers enriched with tomato waste powder targets the dietary requirements of individuals with celiac disease and diabetes, evaluating their nutritional and sensory properties. Tomato residues were obtained from Roma-Spania tomatoes and processed into powder through drying and grinding. The bioactive compounds, including carotenoids, lycopene, and polyphenols, were quantified using established analytical methods. Formulation of the crackers involved optimizing the incorporation of tomato powder into sorghum flour. Subsequently, their nutritional and sensory attributes were assessed. The tomato waste powder demonstrated considerable bioactive potential, with total carotenoid content measured at 66 mg/100g, lycopene at 52.61 mg/100g, and total polyphenols at 463.60 mg GAE/100g. Additionally, the crackers with a 30% powder addition exhibited the highest concentration of polyphenols. Consequently, this sample also demonstrated a high antioxidant activity of 15.04% inhibition of DPPH radicals. Nutritionally, the crackers showed a 30% increase in fiber content and a 25% increase in protein content compared to standard gluten-free products. Sensory evaluation indicated positive consumer acceptance, with an average score of 8 out of 10 for taste and 7.5 out of 10 for color, attributed to the natural pigments from tomato waste. This innovative approach highlights the potential of tomato by-products in creating nutritionally enhanced gluten-free foods. Future research should explore the long-term stability of these bioactive compounds in finished products and evaluate the scalability of this process for industrial applications. Integrating such sustainable practices can significantly contribute to waste reduction and the development of functional foods.

Keywords : tomato waste, circular economy, bioactive compounds, sustainability, health benefits
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